

# International Journal of Advance Research in Computer Science and Management Studies

Research Article / Survey Paper / Case Study

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## *Human Walking Action Recognition Using Artificial Neural Network*

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*Abstract: Human Walking Action has gotten a lot of energy by the investigators today. Walking Action examination recognizes everybody walk conduct. The conduct can be, in any capacity like strolling, running and talking conduct. Right now essential yet profitable instrument is proposed for human stride ID using AI approach. The proposed structure solidifies plot assessment by building highlights and picture division. The preparation and request of diagram is done using self-arranging maps. The proposed method beats the present structure with higher precision.*

*Keywords: Human Action Analysis, behavior, silhouette, image segmentation.*

### I. INTRODUCTION

Human stride acknowledgment is one of the standard biometric strategies, similar to unique finger impression, iris, face, and voice recognition (1,2,3,4). Such degrees of progress have been widely utilized in security fields. Regardless, such biometrics methods require physiological and social properties of various individuals for recognizing evidence. Utilizing the human walk for conspicuous evidence is an unnoticeable strategy that induces no physical contact is fundamental between the subjects and the estimation devices. ID utilizing the human stride doesn't require the organized exertion or the idea of the subjects. Existing step acknowledgment approaches by and large utilize standard camcorders for getting the progression of strolling individuals. Nevertheless, their essential test is the extraction of trademark highlights for conspicuous confirmation of the human gait (5,6,7).

Step acknowledgment strategies are broadly segregated into two procedures, Model-based and sans model. Sans model strategies utilize twofold framework data to see human stride. Model based methodology use body data, for example, body joints for structure a model. Utilizing a standard camera, getting body data is influenced by establishment shading and intensity of the light for the walk acknowledgment. Because of this, these strategies require restricted vibe. With a profundity camera, it is conceivable to get the profundity picture which can seek after body data in the 3-measurement without the prerequisites in the standard camera.

Microsoft Kinect is a profundity camera for the Microsoft Xbox gaming console, empowering players to control and mess around with their body movement and movements. The Kinect additionally engages body acknowledgment and following of individuals logically by an intertwined profundity camera utilizing a SDK given by Microsoft<sup>8</sup>. Shading picture, profundity picture, and human body information can be isolated from the Kinect contraption. Appropriately, two or three specialists as of late proposed these constraints of Kinect to examination for human stride acknowledgment.

We show some potential estimation, for example, edge of body joints, walking rate, and length of body to perceive working individuals utilizing the Microsoft Kinect with the SDK. Correspondingly we expect that a mix of frameworks can improve accuracy of step acknowledgment.

## II. WALK CYCLE

A walk cycle is the timespan of advancements known as a walk. The walk cycle is isolated into two phases, position stage and swing stage as appeared in Figure 1. Position organize is that the foot stays in contact with the ground. It has 60 percent of the walk cycle with 5 advancements. The major progression is heel strike. An impact point is the essential joint of the foot to contact the ground and the weight is exchanged onto the foot. Mid position joins strategy of body weight on the foot. The heel rises while its toes are so far reaching the ground. In addition, some time later, the toe climbs into the air. This advancement is the start of the swing time of the stride cycle. The swing stage incorporates the rest of the 40 percent of the stride cycle. It isn't in contact with the ground. Humans have immaterial indisputable walk cycle subordinate upon the person. We concentrate to discover arranged models subject to their walk cycle. As per the test outcomes, edge highlights from subjects can be looked at by the walk cycle.

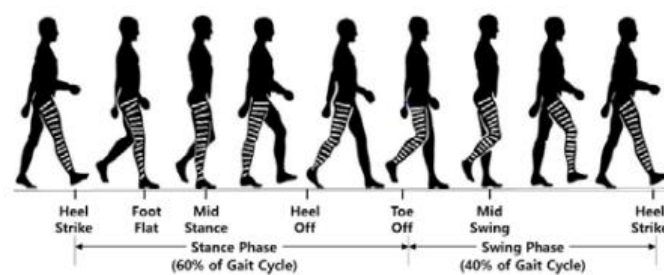


Fig. 1. Human Walk Cycle

### A. Body Frame with Kinect

The Kinect sensor includes a RGB camera and an infrared sensor mix for determining profundities. The Kinect contraction gives body outline information which contains 25 body joints as appeared in Figure 2. Each joint has position 3D space and a way. The body outline information wires 2 finger joints on each hand. Since the finger joints are monotonous for walk acknowledgment, we blocked the finger joints.

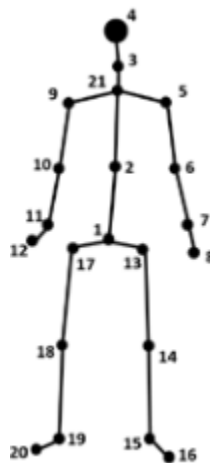


Fig. 2. Body Joints

## III. HUMAN WALK ANALYSIS

This segment gives a delineation of the proposed technique, including the treatment of the formation of highlights, and which highlight can be assessed and have exceptional separations for the human step acknowledgment. The parameters for the walk examination are step length; walk length, speed, point, development line, and so on. We used edge of body joints, strolling rate, and body length for the walk examination utilizing the body outline information in 3D space gave from the Kinect device.

### A. Joint Angle

For the joint point include, 3 joint edges of the spine-mid/hip/knee, hip/knee/lower leg, and knee/lower leg/foot (Shown in Figure 3). Each edge includes body outline information in 3D space. Most researchers about for walk acknowledgment proposed division features<sup>9,10</sup>. In any case, the detachment highlight could have an issue between strolling individuals who have comparative body length and walk. Thusly, we propose the joint point as the fundamental part for human step acknowledgment. The joint point can be specific paying little respect to the issue.

To decide joint points in 3D space without wearable sensors and cameras subject to RGB shading, we utilize infrared profundity information from Kinect device. The joint point in 3D space is more confused to be settled and got than different estimations for walk acknowledgment. Taking into account the explanation, the joint edge can be more uncommon than the others.

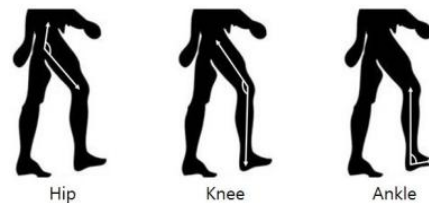


Fig. 3. Join Angles

### B. Length of Body Parts

Body tallness is one of the estimations for stride acknowledgment. Regardless, the estimation is powerless to discover separates between strolling individuals since human statures are when all is said in done comparable in association. Thusly, we propose estimation, length of body parts between 21 body joints. Enduring that we think about all length of body parts, varying individuals could have indisputable length of body parts in any case they could have a similar tallness. This estimation isn't reasonable for walk acknowledgment. All things considered, with joining this with different estimations, the length of body parts can be sensibly utilized for stride acknowledgment, and improve precision of walk acknowledgment.

## IV. LITERATURE SURVEY

M. Hofmann et al.<sup>8</sup>, Author present another spatial transient depiction for Walking Action Recognition, which we call Gradient Histogram Energy Image (GHEI). Like the Gait Energy Image (GEI), data is found the middle value of over full step cycles to decrease clamor. As opposed to GEI, where layouts are arrived at the midpoint of and as such simply edge data at the limit is utilized, our GHEI figures tendency histograms at all zones of the principal picture. Similarly, furthermore edge data inside the individual diagram is gotten.

E. Hossain et al.<sup>9</sup>, propose a novel human-ID plot from long range walk profiles in surveillance recordings. We investigate the bit of multi-see step pictures got from different cameras, the centrality of infrared and observable range pictures in finding personality, and part of sensitive/discretionary biometric (strolling style) in improving the exactness and intensity of the distinctive evidence systems. Preliminary appraisal of two or three subspace based stride include extraction draws near (PCA/LDA) and learning classifier systems (MLP/SMO) on various datasets from a uninhibitedly accessible step database CASIA, show that it is conceivable to do tremendous scope human character acknowledgment from walk data trapped in different view-foci, with different cameras and with use of subtle fragile/helper biometric data.

S. Gabriel-Sanz et al.<sup>10</sup>, concentrated on the assessment of walk acknowledgment on a constrained circumstance, where obliged data can be independent from the step picture progressions. Specifically, maker enthusiastic about getting to the execution of walk pictures when essentially the lower some bit of the body is procured by the camera and only half of a stride cycle is accessible (SFootBD database). Subsequently, extraordinary state of-craftsmanship highlight philosophies have been taken after and related with the information. An association with a standard and perfect walk database (USF database) is additionally finished utilizing close to exploratory show. Results show that exceptional acknowledgment execution can be

worked on utilizing such obliged information data for step biometric (around 85% of rank 5 unmistakable verification rate and 8.6% of EER).

A. O. Lishani et al.11, proposes a regulated component extraction framework which can pick discriminative highlights for human step acknowledgment under the assortments of dress and passing on conditions and in like manner to improve the acknowledgment shows. The proposed framework depends upon the utilization of Haralick's surface highlights detached locally from three zones of Gait Energy Images. The execution has been assessed utilizing CASIA Gait database (dataset B). The exploratory utilizing one-against-all SVM classifier yields engaging results when showed up distinctively corresponding to existing and practically identical procedures.

S. C. Bakchy et al.12, proposed a made strategy for stride recognizing evidence utilizing the component Gait Energy Image (GEI). It is executed utilizing Kohonen Self-Organizing Mapping (KSOM) neural framework. GEI depiction of stride contains all data of each picture in one complete step cycle and requires less capacity and low getting ready speed. As just a single picture is sufficient to store the critical data in GEI highlight, the acknowledgment method is less straightforward than some other component of stride acknowledgment. Step acknowledgment has two or three control like audit edge assortment, walking speed, articles of clothing, conveying load, and so on. Vigorous View Transformation Model (RVTM) is utilized to manage the issue of overview point. RVTM changes the survey edge data from various point to specific edge. RVTM improves acknowledgment execution.

W. G. Bhargavas et al.13, Identification of an individual subject to stride has caused a to drift of energy for PC vision space taking into account its high acknowledgment limit even at a far segment. Vision based position acknowledgment can reinforce Human Computer Interaction (HCI) capably. Step acknowledgment improvement can be utilized in different conventional customary resident and high security applications like vehicle leaves, banks, armed force establishments, railroad stations and plane terminals. The key reason for the task is to build up the modified biometric system to perceive a person in context on his Gait. This can be executed by seeing the subject from the video design, crucial element extraction utilizing skeleton data got from Microsoft Kinect sensor and course of action against the database.

## V. METHODOLOGY

For human walk examination we have utilized Self Organizing Map which is a kind of neural system. The unmistakable step pictures are given as information and reliant on planning it reestablishes the last seen individual of that walk. The all-around requested engineering of proposed structure is showed up in fig. 4.

Proposed architecture consists of:

1. Background subtraction and motion extraction.
2. Human tracking.
3. Silhouette extraction.
4. Normalization.
5. Self-Organizing Maps based learning.
6. Classification
7. Recognition

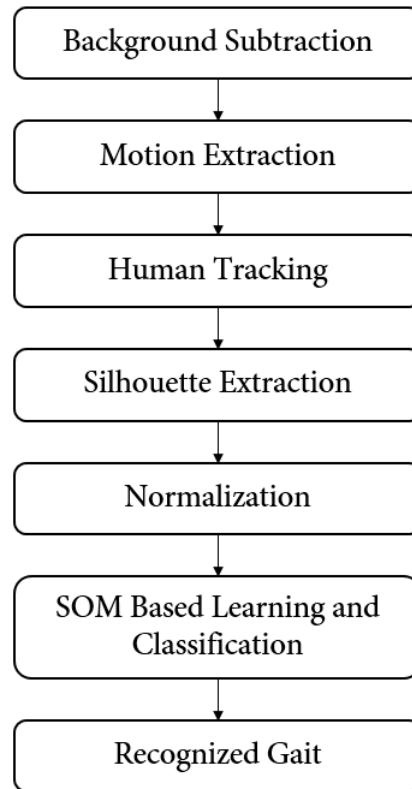


Fig. 4 Proposed System Architecture

#### Background Subtraction

For forefront recognition, establishment subtraction strategy has been commonly used. The camera is set to not move and gets the dynamic scenes. To make strong edges for extraction of establishment is fundamental. To recognize establishment Least Median of Squares system is used. It accumulates the edge of little section of video and figure various forces of pixels.

#### Human Tracking and Silhouette Extraction

To empty the mistake because of division blunder, every closer view zone is then sought after from edge to plot by an immediate correspondence strategy subject to the front of their individual jumping limits any two persistent packaging. That is, we play out a twofold edge association between the present and past plan profiles over a little game-plan of clearings. An example of improvement division and the going with framework are appeared in Fig. 5, from which we can see that the human acknowledgment and following procedure performs well on our information taking everything into account. It thoroughly doesn't affect the going with include extraction process in any case there are a tad of system turns.



Fig. 5. Frames of Datasets

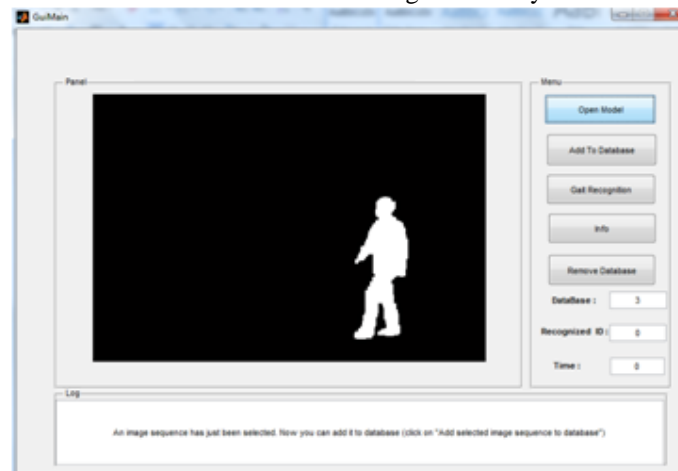
## Neural Network Training

A self-organizing map (SOM) or self-organizing center map (SOFM) is a sort of counterfeit neural framework (ANN) that is readied using unsupervised making sense of how to make a low-dimensional (normally two-dimensional), discretized depiction of the data space of the readiness tests, called a map, and is henceforth a procedure to do dimensionality decrease.

## VI. RESULTS

Step by step process of each phase of algorithm is shown in this section.

STEP 01: Select video/images for analysis.



STEP 02: Adding walking sequence to database

DataBase :	4
Recognized ID :	0
Time :	0

STEP 03: Walking Action Recognition using NN

DataBase :	4
Recognized ID :	1
Time :	68.0068

## VII. CONCLUSION

We have utilized layout dataset for proposed work. We have attempted around 20 ID's of a human. We discovered higher precision while preparing and course of action of human ID's. The future work will be to finished the work with a greater number of highlights instead of essentially limited once.

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